CLAIMS

1. A phase conjugate mirror comprising:

a photonic band gap light guide and

a stimulated Brillouin scattering medium disposed in operational relation to said light guide.

2. The invention of Claim 1 wherein said light guide is an optical fiber.

3. The invention of Claim 2 wherein said fiber has a high index cladding.

4. The invention of Claim 3 wherein said cladding is transparent at a propagation wavelength.

5. The invention of Claim 4 wherein said cladding is a microstructured silica fiber.

6. The invention of Claim 4 wherein said cladding supports guided modes through frustrated tunneling photonic band gap guidance.

7. The invention of Claim 4 wherein said cladding supports guidde modes through Bragg photonic band gap guidance.

8. The invention of Claim 2 wherein said fiber has a hollow core.

9. The invention of Claim 8 wherein said fiber has an array of channels disposed around said core.

10. The invention of Claim 1 wherein said fiber is disposed within a stimulated Brillouin scattering cell.

11. The invention of Claim 1 wherein said medium is gas.

12. The invention of Claim 1 wherein said medium is a gel.

13. The invention of Claim 1 wherein said medium is a liquid.

14. The invention of Claim 1 wherein said medium is a solid.

15. The invention of Claim 1 wherein said medium is electrostrictive and supports acoustic waves.

16. The invention of Claim 1 further including a focusing lens.

17. A phase conjugate mirror comprising:

a photonic band gap light guide, said light guide including an optical fiber having a cladding, a core and an array of channels disposed about said core;

a stimulated Brillouin scattering medium disposed in operational relation to said light guide; and

a focusing lens adapted to focus light on said light guide.

18. The invention of Claim 17 wherein said cladding supports guide modes through frustrated tunneling photonic band gap guidance.

19. The invention of Claim 17 wherein said cladding supports guide modes through Bragg photonic band gap guidance.

20. The invention of Claim 17 wherein said fiber is disposed within a stimulated Brillouin scattering cell.

21. A method for creating a phase conjugate wavefront including the steps of:

focusing a wavefront on a photonic band gap light guide and

creating a reversal wavefront using said light guide and a stimulated Brillouin scattering medium disposed in operational relation to said light guide.